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James M. Smith, Esq.
HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
530 Virginia Road
P.O. Box 9133
Concord, MA 01742-9133

EXAMINER

ZEWDU, MELESS NMN

ART UNIT PAPER NUMBER

2683

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/004,989

Applicant(s)

TERRANOVA ET AL.

Examiner

Meless N. Zewdu

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 October 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-80 and 82-86 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20, 22-24, 26-39, 41, 43, 44, 46-59, 62-67, 69-80 and 82-86 is/are rejected.
- 7) ☒ Claim(s) 21, 25, 40, 42, 45, 60, 61 and 68 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This action is in response to the communication 10/26/05.
2. Claim 81 has been cancelled in the instant amendment.
3. Claim 86 has been added in the instant amendment.
4. Claims 1-80 and 82-86 are pending in this action.
5. This action is final.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 86 is rejected under 35 U.S.C. 103(a) as being unpatentable over Palmero et al. (Palmero) (WO 96/37052) in view of Komrmusch (3,906,405).

As per claim 86: Palmero discloses a method for supporting communications, the method comprising the steps of:

switching to select either transmitting or receiving over a first transducer (see page 5, lines 13-18, lines 25-27; claim 4). The selectable energized transducers can either transmit or receive.

driving/energizing a circuit and the first transducer with a transmitter to generate a magnetic field during times the first transmitter is coupled to the first transducer to transmit over the first transducer (see abstract; page 5, lines 13-27).

positioning a second transducer to receive a portion of the magnetic field transmitted from the first transducer (see (see page 4, lines 28-31). But, Palmero does not explicitly teach about adjusting electrical characteristics of the first circuit to increase a magnetic field generated by the transducer and adjusting electrical characteristics of the second circuit to be different from the electrical characteristics of the first circuit to increase a signal generated by the transducer, as claimed by applicant. However, in a related field of endeavor, Kommrusch teaches about tunable antenna coupling circuit that control the effective values in the circuit to match the impedance (impedance includes reactance) of an antenna at different frequencies to efficiently apply signals between the antenna and the transceiver (see entire document, particularly col. 1, line 36-col. 2, line 31; col. 4, line 8-col.5, line 25). The modifying reference (Kommursch) includes inductor banks and capacitor tanks whose smaller values are progressively increased to achieve a range of selectable frequencies (see col. 3, lines 1-29). Both of the prior art references are wireless systems, particularly directed to coupling tunable antenna/s to a transceiver using circuit adjustment techniques. Hence, the references are reasonably combinable. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify Palmero's reference with the teaching of Kommrusch for the advantage of providing an improved automatic coupling

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circuit which is operable over a wide frequency range for coupling signals between an antenna/transducer and a radio equipment/transceiver (see col. 1, lines 36-39)

Claims 1-5, 6-20, 24, 26-39, 43-44, 46-52, 54-59, 62-64, 69-77 are 82-84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Palmero et al. (Palmero) (WO 96/37052) in view of Kommrusch (3,906,405) and further in view of Nishizawa (US 5,831,348).

As per claim 1: a method for supporting inductive communication, the method comprising the steps of:

coupling a transducer to a selected first circuit for transmitting and receiving to a selected second circuit for receiving reads on '052 (see page 5, lines 10-24). But, Palmero does not explicitly teach about adjusting electrical characteristics of the first circuit to increase a magnetic field generated by the transducer and adjusting electrical characteristics of the second circuit to be different from the electrical characteristics of the first circuit to increase a signal generated by the transducer, as claimed by applicant. However, in a related field of endeavor, Kommrusch teaches about tunable antenna coupling circuit that control the effective values in the circuit to match the impedance of an antenna at different frequencies to efficiently apply signals between the antenna and the transceiver (see entire document, particularly col. 1, line 36-col. 2, line 31; col. 4, line 8-col.5, line 25). The modifying reference (Kommursch) includes inductor banks and capacitor tanks whose smaller values are progressively increased to achieve a range of selectable frequencies (see col. 3, lines 1-29). Both of the prior art references are wireless systems, particularly directed to coupling tunable antenna/s to a

transceiver using circuit adjustment techniques. Hence, the references are reasonably combinable. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify Palmero's reference with the teaching of Kommrusch for the advantage of providing an improved automatic coupling circuit which is operable over a wide frequency range for coupling signals between an antenna/transducer and a radio equipment/transceiver (see col. 1, lines 36-39). But, Palmero in view of Kommursch does not explicitly teach about substantially matching the inductance of the transducer with the capacitance, as claimed by applicant.

However, in a related field of endeavor, Nishizawa teaches about a communication system using magnetic field (see col. 1, lines 8-16), wherein, according to the reference, impedance matching is required to most efficiently drive an electric power from the LC (see col. 4, lines 49-55) and is varied according to the transmit-receive mode of the signal circuit using a capacitor (see col. 4, lines 56-59; col. 5, lines 28-36). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the above references with the teaching of Nishizawa for the advantage of to most efficiently drive an electric power from the LC circuit, as taught by Nishizawa.

As per claim 2: Nishizawa teaches a method, wherein a capacitor is disposed in series with the inductive transducer (see fig. 1, element 59).

As per claim 3: Palmero teaches a method, further comprising the steps of:

Generating an output at one of at least two voltages used to drive the inductive transducer (see page 8, lines 27-31). Selectively energizing at least one transducer includes at least one energizing voltage.

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As per claim 4: a method, further comprising the step of:

adjusting a capacitance of the first circuit to reduce an effective impedance of the transducer for transmitting reads on '405 (see col. 1, line 44-col. 2, line 31; col. 2, line 45-col. 3, line 21).

adjusting a capacitance of the second circuit to increase an effective impedance of the transducer for receiving reads on '405 (see col. 1, line 44-col. 2, line 31; col. 2, line 45-col. 3, line 21). In a duplexer, the first and the second circuits have to be independently adjusted.

As per claim 5: Palmero teaches about a method, further comprising the steps of:

decoupling the transmitter from the first circuit and transducer (claim 4).

Selectively energizing includes selectively energizing and de-energizing (coupling and decoupling).

As per claim 6: a method, wherein the electrical characteristics of the first and second circuits are adjusted to achieve an efficient coupling between either a transmitter or receiver reads on '405 (see col. 1, line 44-col. 2, line 31).

As per claim 7: a method, further comprising the step of:

adjusting a reactance of the first circuit to transmit a magnetically encoded signal at a first carrier frequency and adjusting characteristics of the second circuit to receive a magnetically encoded signal at a second carrier frequency reads on '405 (see col. 1, line 44-col. 2, line 31; col. 2, line 45-col. 21). Transmitting magnetically encoded signal is provided by Palmero. When the references are combined as discussed above,

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adjusting the characteristics of the circuits (transceiver), as taught by Kommrusch, will benefit Palmero's inductive communication system.

As per claim 8: a method, further comprising the step of:

disposing an inductive element in the second circuit, the inductive element having an approximate inductance as that of the transducer reads on '405 (see col. 1, line 44-col. 2, line 31; col. 2, line 45-col. 3, line 21).

As per claim 9: a method, wherein the second circuit includes at least a portion of the first circuit that is coupled via a switch reads on '052 (see page 5, lines 10-24). Since the duplex includes a switch/selecting circuit, at least a portion of one circuit must be part of the other (as it relates transmitter and receiver).

As per claim 10: a method, wherein the first circuit serially tunes the transducer for transmitting over the transducer and the second circuit parallel tunes the transducer for receiving over the transducer reads on '405 (see col. 1, line 44-col. 2, line 20). Specific configuration of a circuit components is a choice of design. As can be seen in the prior art, the components provided therein provide an efficient coupling between an antenna/transducer and the transceiver devices/circuitries.

As per claim 11: a method for supporting communication, the method comprising the steps of:

switching to select either transmitting or receiving over a transducer reads on '052 (see page 5, lines 10-27). A selecting circuitry includes a switching function. But, Palmero does not explicitly teach about effectively tuning the transducer, via a first circuit, to be a low impedance device for generating a magnetic field when a transmitter is switched to

transmit over the transducer, and via a second circuit, effectively tuning the transducer to be a high impedance device for receiving a magnetic field when a receiver is switched to receive over the transducer, as claimed by applicant. However, in a related field of endeavor, Kommrusch teaches about tunable antenna coupling circuit that control the effective values in the circuit to match the impedance of an antenna at different frequencies to efficiently apply signals between the antenna and the transceiver (see entire document, particularly col. 1, line 36-col. 2, line 31). Both of the prior art references are wireless systems, particularly directed to coupling tunable antenna/s to a transceiver using circuit adjustment techniques. Hence, the references are reasonably combinable. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify Palmero's reference with the teaching of Kommrusch for the advantage of providing an improved automatic coupling circuit which is operable over a wide frequency range for coupling signals between an antenna/transducer and a radio equipment/transceiver (see col. 1, lines 36-39). But, Palmero in view of Kommrush does not explicitly teach about coupling at least a portion of the first circuit and transducer to a second circuit, at least a portion of a reactance of the first and second circuits substantially canceling each other, as claimed by applicant. However, in a related field of endeavor, Nishizawa teaches about a magnetic field (inductive) communication wherein a first circuit (see fig. 1, element 50) is, at least partially, coupled to a second circuit (see fig. 1, element 10) while impedance matching is applied to the, as discussed in the rejection of claim 1, above. According to the Nishizawa, impedance matching is required to efficiently transfer power from the LC

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circuit. In other words, power can be transmitted efficiently when the reactance of a circuit/s is reduced. Motivation is same as provided in claim 1, above.

As per claim 12: a method, wherein the first circuit is serially tuned for transmitting over the transducer and the second circuit is parallel tuned for receiving over the transducer reads on '405 (see col. 1, line 44-col. 2, line 20). Specific configuration of a circuit components is a choice of design. As can be seen in the prior art, the components provided therein provide an efficient coupling between an antenna/transducer and the transceiver devices/circuitries.

As per claim 13: a method, further comprising the step of:

in a transmitting mode, reducing an overall reactance of the first circuit including the transducer by substantially matching an inductance of the transducer with a capacitance provided by the first circuit reads on '405 (see col. 1, line 44-col. 2, line 20).

As per claim 14: a method, further comprising the step of:

via switching, decoupling the transmitter from the first circuit and transducer, and coupling the receiver and portion of the second circuit to the first circuit and the transducer reads on '052 (see page 5, lines 10-27). A duplexer with a selecting circuit connects a transducer with a first and second circuit (transceiver) as needed.

As per claim 15: a method, further comprising the step of from the transmitter, generating an output at one of two voltages that is coupled to drive the transducer reads on '052 (see page 5, lines 10-27). Selecting the strongest signal includes outputting at least one voltage that is coupled to drive the transducer.

As per claim 16: a method, further comprising the step of:

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disposing a resistance in series with the transducer reads on '405 (see col. 1, line 44-col. 2, line 31). Impedance matching includes resistance.

As per claim 17: a method, further comprising the step of:

tuning a combined impedance of the first circuit and transducer for maximal magnetic power output of the transducer at a particular carrier frequency reads on '405 (see col. 1, line 44-col. 2, line 31).

As per claim 18: a method, further comprising the step of:

adjusting an impedance of the first and second circuit to transmit and receive over the transducer at a substantially similar carrier frequency reads on '405 (see col. 1, line 44-col. 2, line 31).

As per claim 19: a method, further comprising the step of:

varying inductive characteristics of the transducer to adjust a combined impedance of the first circuit and transducer reads on '405 (see col. 1, line 44-col. 2, line 31).

As per claim 20: a method, further comprising the step of:

adjusting a reactance of the first or second circuits by switching selected capacitors of a capacitor bank reads on '405 (see col. 2, line 50-col. 3, line 21).

As per claim 24: a method, further comprising the step of:

in a receiving mode, coupling at least a portion of the first circuit to the second circuit via a switch and decoupling the transmitter from at least a portion of the first circuit and transducer reads on '052 (see page 5, lines 10-24). A duplexer with a selecting circuit functions in two modes (transmit and receive) by being coupled and decoupled.

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As per claim 26: a method, wherein a combined reactance of the second circuit coupled with at least a portion of the first circuit is reduced via an inductor matched with an inductance of the transducer reads on '405 (see col. 1, line 44-col. 2, line 20; col. 2, line 40-col. 3, line 21).

As per claim 27: a method, further comprising the step of:
disposing an electronic switch circuit between an output of the transmitter and the first circuit for coupling and decoupling the transmitter to the first circuit reads on '052 (see page 5, lines 10-24). A selecting circuitry is a switch.

As per claim 28: a method, further comprising the steps of:
providing switching capability to select which of multiple transducers to transmit and receive a magnetically encoded signal depending on which transducer is selected reads on '052 (see page 2, lines 10-20; page 5, lines 10-27), adjusting an impedance of the first or second circuit reads on '405 (see col. 1, line 44-col. 2, line 20).

As per claim 29: a method, further comprising the steps of:
adjusting a reactance of the first circuit depending on a selected one of the multiple transducers to minimize an overall impedance of the selected transducer and first circuit reads on '405 (see col. 1, line 44-col. 2, line 31).

driving a combination of the selected one of the multiple transducers and the first circuit with the transmitter reads on 405 (see col. 2, lines 14-31).

As per claim 30: a method, further comprising the step of:
disposing the multiple transducers to be substantially orthogonal to each other reads on '052 (see page 1, lines 10-20).

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As per claim 31: a method, further comprising the step of:

Disposing the multiple transducers to be substantially orthogonal to each other reads on '052 (see figs. 5 and 6; page 5, lines 13-20).

switching the first and second circuit to transmit on one transducer while receiving on

another transducer reads on '052 (see page 5, lines 10-24).

As per claim 32: a method, further comprising the step of:

switching the second circuit and receiver to receive on a different transducer when no signal is received on a particular transducer reads on '052 (see page 5, lines 10-24).

As per claim 33: a method, further comprising the steps of:

setting switch circuitry to receive over the transducer reads on '052 (see page 5, lines 13-20).

transmitting a signal at a particular carrier frequency on a second transducer whose output couples to the transducer reads on '052 (see page 5, lines 10-24).

adjusting a reactance of the second circuit to receive a maximum signal over the transducer reads on '405 (see col. 1, line 44-col. 2, line 31).

As per claim 34: a method, further comprising the step of:

disposing a switch at an output of the transmitter to couple the transmitter to the first circuit and transducer reads on '052 (see page 5, lines 10-24). The selecting circuitry can be considered a switch.

As per claim 35: a method, further comprising the step of:

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switching to a receiving mode to receive over the transducer reads on '052 (see page 5, lines 10-24).

increasing an effective impedance of the transducer to receive an optimal signal at the receiver reads on '405 (see col. 1, line 44-col. 2, line 31).

As per claim 36: a method for supporting communication comprising the steps of:

switching to select one of multiple circuit paths for either transmitting or receiving over a transducer via inductive coupling reads on '052 (see page 5, lines 18-20). A circuitry that can select includes a switch. But, Palmero does not explicitly teach about reducing an overall impedance of a first circuit path including the transducer to transmit an inductive signal over the transducer and reducing an overall impedance of at least a portion of a second circuit path including a switch for receiving an inductive signal over the transducer, as claimed by applicant. However, in a related field of endeavor, Kommrusch teaches about tunable antenna coupling circuit that control the effective values in the circuit to match the impedance of an antenna at different frequencies to efficiently apply signals between the antenna and the transceiver (see entire document, particularly col. 1, line 36-col. 2, line 31). Both of the prior art references are wireless systems, particularly directed to coupling tunable antenna/s to a transceiver using circuit adjustment techniques. Hence, the references are reasonably combinable. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify Palmero's reference with the teaching of Kommrusch for the advantage of providing an improved automatic coupling circuit which is operable over a wide

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frequency range for coupling signals between an antenna/transducer and a radio equipment/transceiver (see col. 1, lines 36-39). But, Palmero in view of Kommrusch does not explicitly teach about reducing at least a portion of a reactance along the second circuit path including the transducer by substantially matching a reactance of the transducer with at least one circuit component disposed along the second circuit path, as claimed by applicant. However, in a related field of endeavor Nishizawa teaches about magnetic field (inductive) communication wherein at least a portion of one circuit (first circuit) is coupled to another circuit (second circuit) using impedance matching wherein the circuits include coils (transducers) for transmitting and receiving (see col. 1, lines 8-16; figs. 1-5; col. 4, lines 44-59). Reason and motivation is same as provided in the rejection of claim 1 above.

As per claim 37: a method, further comprising the steps of:

switching a transmitter to transmit over the transducer via the first circuit path reads on '052 (see page 5, lines 13-27).

reducing an overall impedance of the first circuit path including the transducer by substantially matching an impedance of the transducer with circuit components disposed along the first circuit path reads on '405 (see col. 1, line 36-col. 2, line 31).

As per claim 38: a method, wherein the circuit components along the first path includes at least one capacitor to reduce an overall impedance of the first circuit reads on '405 (see col. 1, line 44-col. 2, line 31; col. 2, line 50-col. 3, line 21). The capacitor bank of the prior art is used to adjust the over all circuit impedance.

As per claim 39: a method, further comprising the step of:

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disposing the second circuit path to include at least a portion of the first circuit path reads on '052 (see page 5, lines 10-24).

decoupling the transmitter from the first circuit path via a first switch reads on '052 (see page 5, lines 10-24). A selecting circuitry is a switch to the duplex.

As per claim 41: Nishizawa teaches a method wherein the second circuit path includes at least one serially disposed inductive element (see fig. 1). Examiner is not clear to what circuit element the inductive element is serially disposed/connected.

As per claim 43: a method wherein the second circuit path includes a serially disposed switch reads on '052 (see page 10-27). A switch is known to be in series with the device it controls.

As per claim 44: a method further comprising the step of:
tuning a combined reactance along the first circuit path including the transducer for maximal magnetic power output of the transducer at a particular carrier frequency reads on '405 (see col. 1, line 44-col. 2, line 20).

As per claim 46: a method further comprising the step of:
selecting among which of the multiple transducers to transmit and receive information reads on '052 (see page 5, lines 10-24; page 6, lines 19-30).
depending on which transducer is selected, adjusting an impedance along a corresponding circuit path to respectively transmit or receive over the selected transducer reads on '405 (see col. 1, line 36-col. 2, line 31).

As per claim 47: a method further comprising the step of:

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disposing the multiple transducers to be substantially orthogonal to each other reads on '052 (see page 5, lines 13-27).

As per claim 48: a method further comprising the steps of:

coupling a receiver to the second circuit path for receiving over the transducer reads on '052 (see page 5, lines 10-24). A duplexer is able to couple a transducer to a transmitter and a receiver (a first and a second circuits) as needed.

transmitting a signal at a particular carrier frequency on a second transducer whose output couples to the transducer reads on '052 (see abstract; page 5, lines 10-24). The prior art reference is able to select a particular carrier frequency.

adjusting a reactance along the second circuit path to receive a maximum signal at the receiver reads on '405 (see col. 1, line 44-col. 2, line 31; col. 2, line 45-col. 3, line 21). Impedance matching includes adjusting reactance of a capacitor.

As per claim 49: a method further comprising the step of:

Reducing the reactance of a portion along the second circuit path for receiving over the transducer reads on '405 (see col. 1, line 36-col. 2, line 31).

As per claim 50: a method further comprising the step of:

tuning the transducer with a capacitor in parallel with the transducer reads on '405 (see col. 1, line 44-col. 2, line 20).

As per claim 71: the features of claim 71 are similar to the features of claim 1, except "decoupling the transducer from the first circuit path and coupling the transducer to the second circuit path to receive" wherein "the second circuit path including a portion of the first circuit path". This feature is directed to a half duplexer which is well known in the art

of wireless communication. Hence, claim 71 is rejected on the same ground and motivation as claim 1. But, Plmero in view of Kommrusch does not explicitly teach about intermittently adjusting circuit characteristics during use based on upon feedback to more efficiently transmit or receive over the transducer, as claimed by applicant.

However, in a related field of endeavor, Nishizawa teaches about a magnetic field (inductive) communication wherein the circuit characteristics are adjusted (see col. 8, lines 15-50; col. 9, lines 9-20, lines 37-45; col. 10, lines 3-10). Circuit characteristic is adjusted according to transmit-receive mode operation, which can read on feedback.

Reason and Motivation is as provided in the rejection of claim 1, above.

As per claim 72: a method, wherein a capacitance of the circuit is adjusted to tune the transducer reads on '405 (see col. 2, lines 13-20). When the references are combined as discussed above, the capacitance of the circuit provided by Kommursch, will be adjusted (with values from the cap. bank) to tune Palmero's transducer.

As per claim 73: a method, wherein the circuit is adjusted to independently tune the transducer for transceiving an inductive signal reads on '405 (see col. 1, lines 59-65).

As per claim 74: a method, further comprising the step of:
selecting a setting of the circuit via electronic switching to tune the transducer reads on '405 (see col. 1, lines 44-59).

As per claim 75: a method, further comprising:
sweeping through a range of circuit settings to determine which of multiple settings is optimal for transceiving over the transducer reads on '405 (see col. 1, lines 44-65).

As per claim 76: a method further comprising:

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reducing power consumption of the circuit by adjusting the circuit for generating a more efficient magnetic signal reads on '052 (see abstract; page 4, line 28-page 5, line 3).

As per claim 77: a method, further comprising:

switching selected capacitors of a capacitor bank to ground via switches to tune the transducer for transceiving reads on '405 (see col. 1, line 44-col. 2, line 31; col. 2, line 50-col. 3, line 21).

As per claim 82: a method, further comprising:

adjusting the circuit to transceive over the transducer at a selected carrier frequency reads on '052 (see page 6, lines 13-30).

As per claim 83: a method, further comprising:

modulating digital data on the carrier frequency to transmit information to a target receiver reads on '052 (see page 1, lines 28-29; page 2, lines 8-20; page 6, lines 13-30).

As per claim 84: a method, further comprising:

switching an inductor in series with the transducer to tune the transducer for receiving a magnetic field reads on '405 (see col. 1, lines 40-65; col. 2, line 59-col. 3, line 21).

Claims 51-52, 54-59, 62-64 and 69-70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Palmero in view of Kommursch and further in views of Lou et al. (Lou) (US 6,369,550 B1) and Nishizawa.

As per claim 51: a method for supporting communication comprising the steps of:

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coupling one of multiple transducers to a circuit to transmit or receive a magnetic field reads on '052 (see page 2, lines 8-20). But, Palmero does not explicitly teach about adjusting characteristics of the circuit depending on which of the multiple transducers is coupled to the circuit, as claimed by applicant. However, in a related field of endeavor, Kommursch teaches about tunable antenna coupling circuit that control the effective values in the circuit to match the impedance of an antenna at different frequencies to efficiently apply signals between the antenna and the transceiver (see entire document, particularly col. 1, line 36-col. 2, line 31). Both of the prior art references are wireless systems, particularly directed to coupling tunable antenna/s to a transceiver using circuit adjustment techniques. Hence, the references are reasonably combinable. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify Palmero's reference with the teaching of Kommursch for the advantage of providing an improved automatic coupling circuit which is operable over a wide frequency range for coupling signals between an antenna/transducer and a radio equipment/transceiver (see col. 1, lines 36-39). But, Palmero in view of Kommursch do not explicitly teach about adjusting characteristics of a circuit during use based upon feedback to more efficiently transmit or receive over one of multiple transducers, as claimed by applicant. However, in a related field of endeavor, Lou teaches about a feedback technique for adjusting input impedance by balancing inductive and capacitive components a feedback control circuit (see entire document, particularly abstract). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to further modify the above references with the teaching of Lou for

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the advantage of permitting adjustment of input impedance using Lou's feedback circuit in the system of Palmero as modified Kommursch. But, Palmero in view of Kommrusch does not explicitly teach about intermittently adjusting circuit characteristics, as claimed by applicant. However, in a related field of endeavor, Nishizawa teaches about a magnetic field (inductive) communication wherein a transmitting and receiving devices are inductively coupled and circuit characteristics are adjusted (see col. 10, lines 3-10). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the above references with the teaching of Nishizawa for the advantage stated/ provided in the rejection of claim 1, above.

As per claim 52: a method, wherein a capacitance of the circuit is adjusted to tune the transducer reads on '405 (see col. 1, line 44-col. 2, line 31; col. 2, line 45- col. 3, line 21). When the references are combined as discussed above, the capacitance of the circuit provided by Kommrusch, will be adjusted (with values from the cap. bank) to tune Palmero's transducer.

As per claim 54: a method, further comprising the step of:
selecting a setting of the circuit via electronic switching to tune the transducer reads on '405 (see col. 1, lines 44-59).

As per claim 55: a method, further comprising the step of:
positioning each of the multiple transducers along a unique axis with respect to each other reads on '052 (see page 5, lines 13-27).

As per claim 56: a method, further comprising the step of:

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orthogonally positioning three transducers with respect to each other reads on '052 (see page 5, lines 13-27).

As per claim 57: a method further comprising the step of:

selecting from which of the multiple transducers to transmit or receive a magnetic field reads on '052 (see page 5, lines 10-27).

tuning the selected transducer to support a wireless link with a remote transceiver device having a single transducer that transmits and receives reads on '052 (see page 6, lines 13-30).

As per claim 58: a method further comprising the step of:

adjusting an impedance of the circuit to tune a transducer for transmitting or receiving reads on '405 (see col. 1, lines 59-65).

As per claim 59: a method further comprising the steps of:

coupling a first transducer of the multiple transducers to the circuit for transmitting reads on '052 (see page 5, lines 10-12).

coupling a second transducer of the multiple transducers to the circuit for receiving reads on '052 (see page 5, lines 10-12).

transmitting a signal over the first transducer and receiving the signal over the second transducer reads on 052 (see page 5, lines 10-12). Basically, the features of claim 59 are similar to the features of claim 1.

As per claim 62: a method further comprising:

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sweeping through a range of circuit settings to determine which of multiple settings is optimal for transmitting or receiving over a selected transducer reads on '405 (see col. 1, lines 44-65).

As per claim 63: a method further comprising:

Reducing power consumption of the circuit by increasing a magnetic a magnetic signal generated by a selected transducer based upon adjustment to the circuit reads on '052 (see abstract; page 4, line 28-page 5, line 3).

As per claim 64: a method further comprising:

Switching selected capacitors of a capacitor bank to ground via switches to tune a transducer for transmitting or receiving reads on '405 (see col. 1, line 44-col. 2, line 31; col. 2, line 50-col. 3, line 21).

As per claim 69: a method further comprising:

adjusting the circuit to transmit or receive over the transducer at a selected carrier frequency reads on '052 (see page 6, lines 13-30).

As per claim 70: a method further comprising:

modulating digital data on the carrier frequency to transmit information to a target receiver reads on '052 (see page 1, lines 28-29; page 2, lines 8-20; page 6, lines 13-30).

Claims 22-23 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references applied to claims 1, 12, 36, 51 and 71 above, and further in view of Shloss et al. (Shloss) (US 5,425,032).

As per claim 22: Palmero teaches about a method, further comprising the steps of:

decoupling the transmitter from the first circuit and transducer (claim 4).

Selectively energizing includes selectively energizing and de-energizing (coupling and decoupling).

As per claim 22: a method, wherein information is transmitted and received over the transducer based on time division multiplexing read on '032 (see col. 3, lines 6-32; col. 4, lines 13-38; col. 5, lines 8-20; col. 7, line 23-col. 8, line 2). Since claim 32 is similar to claim 5, it is rejected on the same ground and motivation as claim 5.

As per claim 23: a method, wherein the transducer supports half-duplex communication with a remote transceiver reads on '052 (see page 6, lines 19-30).

As per claim 53: a method as in claim, wherein the circuit is adjusted to independently tune the transducer for transmitting or receiving at different time intervals reads on '032 (see col. 3, lines 6-32; col. 4, lines 13-38; col. 5, lines 8-20; col. 7, line 23-col. 8, line 2). Since claim 53 is similar to claim 5, it is rejected on the same ground and motivation as claim 5.

Claims 78-80 and 65-67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Palmero in view of Petro as applied to claim 71 above, and further in view of Wilkins et al. (Wilkins) (US 4,965,607).

As per claim 78: but, Palmero in view of Kommrusch do not explicitly teach about a method of:

storing circuit setting information in memory regarding how to set a circuit, as claimed by applicant. However, in a related field of endeavor, Wilkins teach about an antenna coupler wherein the coupler includes a means for tracking the frequency of a swept

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transmitted signal and a means responsive to tracked signal for automatically adjusting the adjustable impedance matching means to provide proper impedance matching (see col. 1, lines 55-64; col. 2, lines 39-45) and wherein the coupler recalls the matched network settings from **memory** (see col. 3, line 65-col. 4, line 3). Note: using the circuit settings for transceiving over the transducer is an intended use. The stored circuit settings, as can be understood by one of ordinary skill in the art, can also be used in other areas of communications. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to further modify the above references with the teaching of Wilkins for the advantage of tuning the antenna to a desired frequency without a transmit tune sequence (see col. 4, lines 2-3).

As per claim 79: a method, further comprising:

learning which of multiple settings is optimal for transceiving over the transducer and storing corresponding information in memory reads on '607 (see col. 3, line 65-col. 4, line 3).

As per claim 80: a method, further comprising:

retrieving circuit setting information from memory and adjusting characteristics of the circuit to transceive over the transducer reads on '607 (see col. 3, line 65-col. 4, line 3).

Tuning an antenna requires an adjustment of a radio equipment.

As per claim 65: a method further comprising:

storing circuit setting information in memory regarding hoe to set a circuit for receiving or transmitting reads on '607 (see col. 3, line 65-col. 4, line 3).

As per claim 66: a method further comprising:

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learning which of multiple settings is optimal and storing corresponding information in memory reads on reads on '607 (see col. 3, line 65-col. 4, line 3).

As per claim 67: a method further comprising:

retrieving circuit setting information from memory and adjusting characteristics of the circuit to transmit or receive over a transducer reads on '607 (see col. 3, line 65-col. 4, line 3). Tuning an antenna requires an adjustment of radio equipment.

Response to Arguments

Applicant's arguments with respect to claims 1-80 and 82-85 have been considered but are moot in view of the new ground(s) of rejection.

Allowable Subject Matter

Claims 21, 25, 40, 42, 45, 60-61 and 68 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Examiner notes that claim 81 (now cancelled) was objected in the previous action. Applicant, in the current amendment, modified claim 71 (on which claim 81 was depended) using the feature of claim 81. But, it is also to be noted that the previous scope of claim 71 is changed due to applicant's strike –through some of the features of claim 71 in view of which claim 81 was objected. Furthermore, the indicated allowability to claim 41 has

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been withdrawn since applicant has reconfigured the claim (claim 41) to make depend on claim 36 instead of on claim 40, the basis of which the indicated allowability was made.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Meless N. Zewdu whose telephone number is (571) 272-7873. The examiner can normally be reached on 8:30 am to 5:00 pm..

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Trost can be reached on (571) 272-7872. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any inquiry of a general nature relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-2600.

Meless zewdu

M. Z.

Examiner

05 January 2006.



WILLIAM TROST
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600